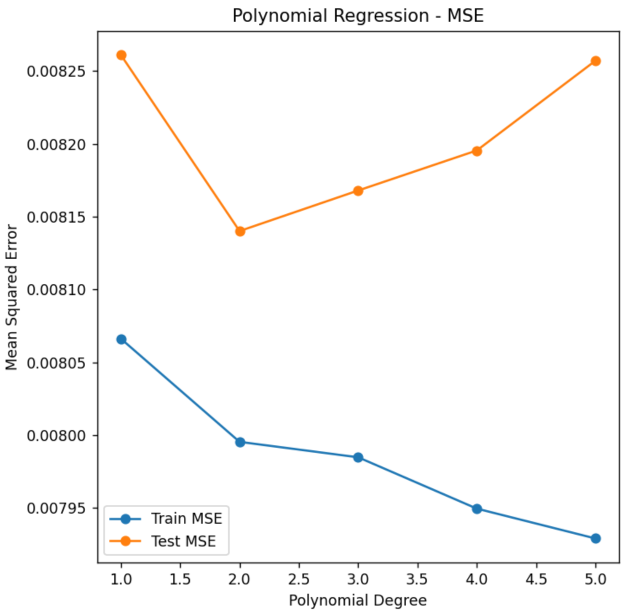
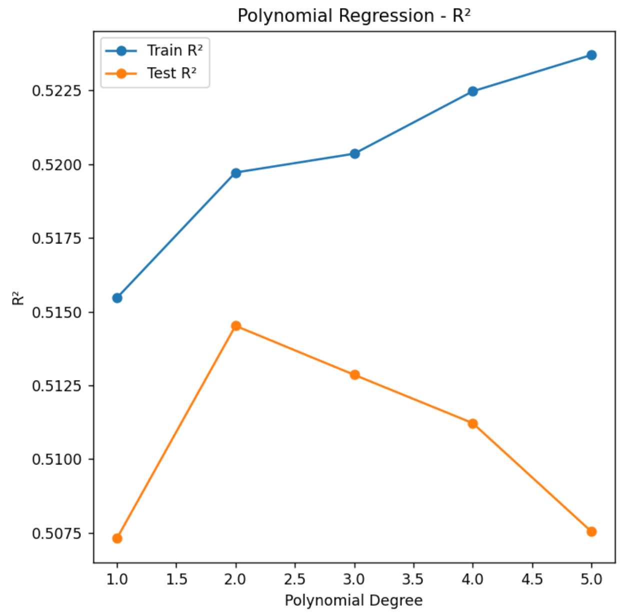
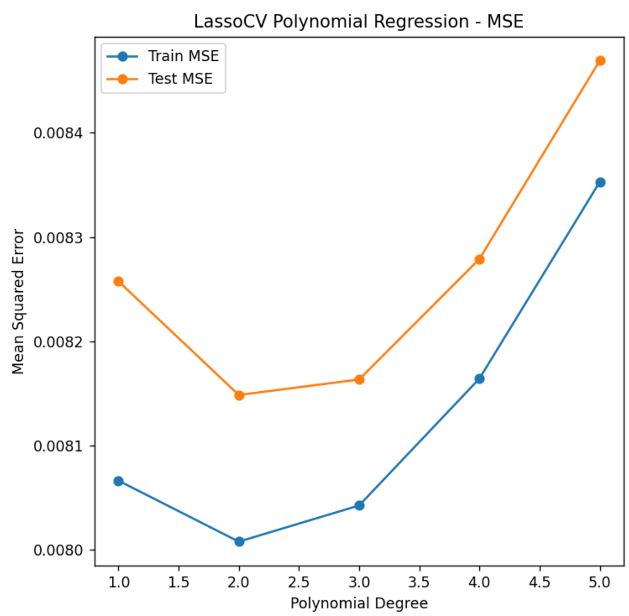
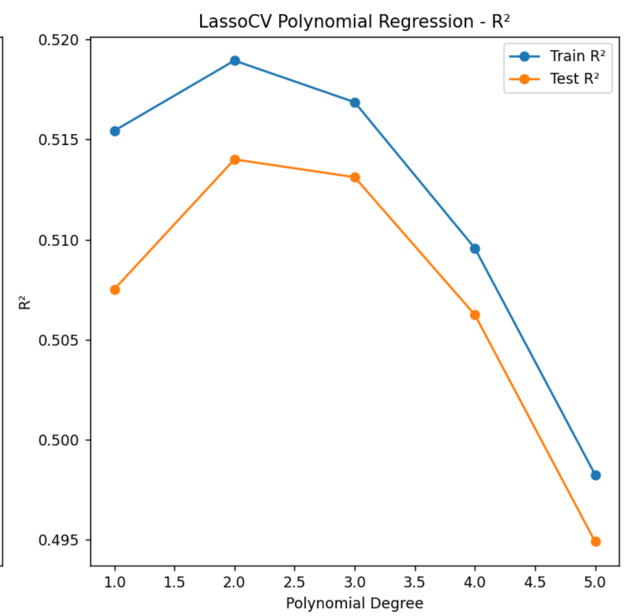

Polynomial Regression - MSE
Mean Squared Error
Polynomial Degree
Train MSE
Test MSE
0.00825
0.00820
0.00815
0.00810
0.00805
0.00800
0.00795
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0


Polynomial Regression - R²
R²
Polynomial Degree
Train R²
Test R²
0.5225
0.5200
0.5175
0.5150
0.5125
0.5100
0.5075
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0


LassoCV Polynomial Regression - MSE
Mean Squared Error
Polynomial Degree
Train MSE
Test MSE
0.0084
0.0083
0.0082
0.0081
0.0080
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0


LassoCV Polynomial Regression - R²
R²
Polynomial Degree
Train R²
Test R²
0.520
0.515
0.510
0.505
0.500
0.495
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0

Polynomial Regression Results:

Degree	Train MSE	Test MSE	Train R²	Test R²
1	0.0080661	0.00826095	0.515462	0.507308
2	0.00799529	0.00814004	0.519716	0.51452
3	0.00798468	0.00816789	0.520353	0.512858
4	0.00794944	0.00819539	0.52247	0.511219
5	0.00792894	0.00825701	0.523702	0.507543

LassoCV Polynomial Regression Results:

Degree	Train MSE	Test MSE	Train R²	Test R²
1	0.00806648	0.00825762	0.51544	0.507507
2	0.00800798	0.00814863	0.518954	0.514007
3	0.00804266	0.00816351	0.51687	0.51312
4	0.00816433	0.00827903	0.509562	0.50623
5	0.00835292	0.00846933	0.498233	0.49488

```
PS C:\Users\esme1\Python For 481>
```

Looking at the results of the code and testing, it appears that in normal linear regression, overfits after the 2^{nd} polynomial degree. When looking for overfitting, the test and training MSE are good to observe and not that if they move further away from each other, it may be due to overfitting, which is what happens after the 2^{nd} polynomial degree when they separate. Also, the test MSE for regular linear regression increases as the polynomial order increases, which can also suggest overfitting.

As for the LassoCV results, less overfitting occurs since the lasso function is to utilize cross-validation to regularize parameters to minimize the MSE and therefore reduce overfitting. Looking at the model, the MSE does increase with the polynomial order after the 2^{nd} degree like the linear regression, which means there is overfitting. The difference, however, is that the training MSE follows the testing MSE and they get closer to each other with each polynomial order, a sign that the

overfitting is reduced compared to the normal linear regression. The LassoCV model also has any MSE that increases significantly faster than the linear regression MSE which can be seen at the 5th order where the LassoCV MSE is greater than 0.0084 while the normal linear regression has the 5th order MSE at just over 0.00825.